IN THE UNITED STATES PATENT AND TRADE MARK OFFICE

In re Application of: A. Polyakov et al (KOMBINAT "ELECTROKHIMPRIBOR")
serial No.: 09/667,282
Filed: September 22, 2000
For: Method of separation of palladium isotopes in electromagnetic separator using a source of ions

DECLARATION OF MR. A.P. BELOBORODOV UNDER 37 CFR 1.132

Hon. Commissioner of Patents and Trademarks Washington, D. C. 20231

Sir:

I, Alexander Pavlovich BELOBORODOV, declare and state;

1. I am a citizen of the Russian Federation.
2. I graduated from the Uralsky Piolytechnichesky University in 1967.
3. I am an engineer-physicist of the Isotope Production Division of KOMBINAT "ELECTROKHIMPRIBOR" working there for 30 years.
4. I am not an inventor of the invention claimed in Application 09/667,282.
3. I am familiar with the patent application and the file history thereof as well as close references (patents US 5,110,562 and US 4,704,197), and I performed experiments according to the invention.
4. The subject matter of the present patent application is a method of **separation of palladium isotopes in electromagnetic separator using a source of ions.**
5. The claimed method provides simultaneous separations of all palladium isotopes in one cycle. There is a need for such type of separation in many

countries as palladium isotopes are in high demand in Russia and abroad. A big advantage of the method is its high productivity. It is proved by data given in the specification.

I have conducted a series of the experiments to evaluate a temperature of the method as it depends on many factors: the size of the outlet of the gas discharge chamber, the level of vacuum, conditions of arc discharge in gas discharge chamber, the amount of ion current of isotopes to the unit of receiver boxes, the level of isotope ion beam focusing represented as the ratio of the ion current of isotopes to the unit of receiver boxes to the ion current of isotopes to the main adjusting electrode, etc. The inventors proposed to maintain the crucible and gas discharge chamber temperature in certain ranges (see Fig. 1) and proved it by a series of experiments.

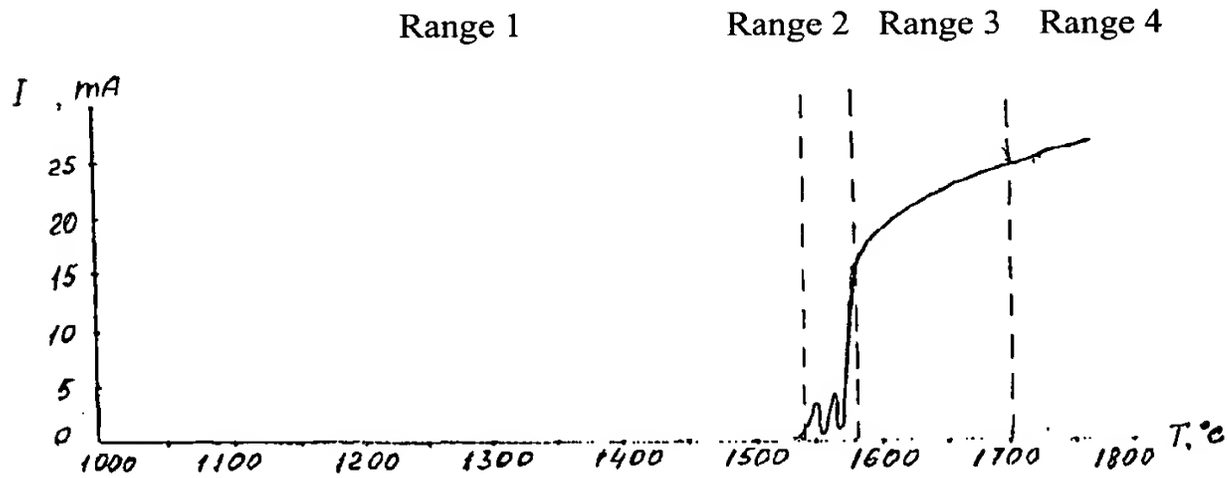

Fig. 1

Range 1: up to 1540°C – there is no discharge, the current in the receiver is equal to 0.

Range 2: the discharge appears at a temperature of 1540-1580°C but it is not stable (often does out);

Range 3: the discharge practically does not go out at temperatures of 1580-1700°C, it becomes stable and can be controlled with, for example, voltage or discharge current, and set required current and ratios;
Range 4: at temperatures above 1700°C the regime of the source changes into one where there is redundant amount of working substance steam in the discharge chamber. The isotope beam deflects downwards and partially does not get into receiving boxes. High voltage disruptions and leakage currents appear in the gap between the electrodes affecting the process. Consumption of the working substance increases, strong interaction between melted palladium and graphite of the crucible appears which sometimes causes destruction of crucible walls and splitting of palladium on the elements of the source leading to its permanent damage.
In Range 4 when the discharge voltage and current are stable, the slots of the discharge chamber are 180 x 1.5 mm^2 , the isotope ion currents in the receiving boxes were selected (I = 15-25 mA) to provide required productivity and enrichment (see the table).

I cannot agree with the Examiner's citing of Sasao and Trajmar. They do not have the features of the present invention and do not provide the same result solely or in combination.

The Examiner's opinion that the temperature range of 1580-1700°C is obvious for a specialist in the art with ordinary skills is not acceptable. I strongly believe that it is not possible for the specialist to come to the range because prior to filing the application there was no data published in technical literature about the process parameters and their calculations.

The inventors made a long series of experiments to come to the solutions regarding the parameters of simultaneous separation of palladium isotopes.

Nobody before has received the unexpected results they discovered in the technical solutions. We can show the data on enrichment obtained at a similar equipment in Oak Ridge (E. Newman et al, Some new Techniques and Recent Developments in Isotope Separation at Oak Ridge, pp. 90-91, Nuclear Instruments and Methods, 139, 1976) in comparison with the data obtained at Electrokhimpribor (see the table).

Table

	Isotopes	Isotopes produced at Oak Ridge on metallic palladium (I = 2,6 mA)	Isotopes produced at Oak Ridge on gas inleakage (I = 22,5 mA)	Isotopes produced at Electrokhimpribor in the latest experiment
1.	Pd-102	75.45 %	77.89%	88.76%
2.	Pd-104	89.75 %	95.25%	97.33%
3.	Pd-105	94.51 %	97.38%	98.27%
4.	Pd-106	96.66%	98.48%	99.32%
5.	Pd-108	98.11%	98.88%	99.70%
6.	Pd-110	96.98 %	97.73%	99.50%

As it follows from the table the solution according to the present invention implemented at Electrokhimpribor provides higher enrichment compared to the best results of the specialists at Oak Ridge (USA).

The claimed invention has one more advantage if comparing with artificial combination of '562 (Sasao) and '197 (Trajmar). Its productivity is higher because all palladium isotopes are separated in one cycle whereas only one isotope can be separated in a cycle using the apparatus according to '562.

Thus the Examiner's decision that the technical result according to the present invention can be achieved combining patents US 5,110,562 and US 4,704,197 is not justified.

6. The undersigned declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize any patent issued thereon.

February 02,2004
Date

Beloborodov A.P.
signature

A.P. Beloborodov